AF/3748

TRANSMITTAL OF APPEAL BRIEF

Docket No. 200-1731/65080-0041

In re Application of: Donald J. Lewis

Application No.	Filing Date	Examiner	Group Art Unit
09/783,352	February 14, 2001	D. Tran	3748

Invention: SYSTEM AND METHOD FOR CONTROLLING ENGINE AIR/FUEL RATIO DURING HYDROCARBON TRAP PURGING

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed: September 9, 2002 .

The fee for filing this Appeal Brief is 320.00 .

[X] Large Entity [ ] Small Entity

[ ] A check in the amount of _____ is enclosed.

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Dated: November 12, 2002

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Appeal Brief Transmittal

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail, in an envelope addressed to: Commissioner for Patents, Washington, DC 20231, on the date shown below.

Dated: November 12, 2002 Signature: Diane R. Lytle (Diane R. Lytle)

PTO/SB/17 (10-02)
Approved for use through 10/31/2002. OMB 0651-0032

FEE TRANSMITTAL for FY 2003

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 320.00

Complete if Known	
Application Number	09/783,352
Filing Date	February 14, 2001
First Named Inventor	Donald J. Lewis
Examiner Name	D. Tran
Group Art Unit	3748
Attorney Docket No.	65080-0041/200-1731

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit Card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account

Deposit Account Number: 06-1510

Deposit Account Name: Ford Global Technologies, Inc.

The Commissioner is hereby authorized to: *(check all that apply)*

☒ Charge fee(s) indicated below ☒ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	740	2001	370	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	510	2003	255	Plant filing fee	
1004	740	2004	370	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) 0.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

			Extra Claims		Fee from below	=	Fee Paid
Total Claims		-** =		x		=	
Independent Claims		-** =		x		=	
Multiple Dependent						=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0.00

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge – late filing fee or oath	
1052	50	2052	25	Surcharge – late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	400	2252	200	Extension for reply within second month	
1253	920	2253	460	Extension for reply within third month	
1254	1,440	2254	720	Extension for reply within fourth month	
1255	1,960	2255	980	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	320.00
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,280	2453	640	Petition to revive - unintentional	
1501	1,280	2501	640	Utility issue fee (or reissue)	
1502	460	2502	230	Design issue fee	
1503	620	2503	310	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	740	2809	370	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	740	2810	370	For each additional invention to be examined (37CFR 1.129(b))	
1801	740	2801	370	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
Other fee (specify)					

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 320.00

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	Glenn E. Forbis	*Registration No. (Attorney/Agent)*	40,610	*Telephone*	(248) 594-0636
Signature				*Date*	November 12, 2002

Certificate of Mailing Under 37 CFR 1.8

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Washington, DC 20231

on November 12, 2002
Date

Diane R. Lytle
Signature

Diane R. Lytle
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Fee Transmittal

S. Little 11-21-02

#11/Brief

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Lewis

Group Art Unit: 3748

Serial No.: 09/783,352

Examiner: Tran, D.

Filed: February 14, 2001

For: **SYSTEM AND METHOD FOR CONTROLLING ENGINE AIR/FUEL RATIO DURING HYDROCARBON TRAP PURGING**

Attorney Docket No. 200-1731 (65080-0041)

APPEAL BRIEF

Box AF
Commissioner for Patents
United States Patent and Trademark Office
Washington D.C. 20231

Dear Sir:

This is an appeal brief from the final rejection of claims 5-7 and 9-13 of the Final Office Action dated May 8, 2002. This application was filed on February 14, 2001.

I. REAL PARTY IN INTEREST

The real party in interest is Ford Global Technologies, Inc., Assignee, a corporation organized and existing under the laws of the state of Michigan, and having a place of business at Suite 600, Parklane Towers East, One Parklane Boulevard, Dearborn, Michigan 48126.

II. RELATED APPEALS AND INTERFERENCES

Applicants are not aware of any related appeals or interferences that would affect the Board's decision on the current appeal.

III. STATUS OF CLAIMS

Claims 5-7 and 9-13 are pending in this application. Claims 5-7 and 9-13 have been rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been entered into the prosecution record of the present application.

V. SUMMARY OF THE INVENTION

The present invention relates to a system and method for controlling the air/fuel ratio in an internal combustion engine while a downstream hydrocarbon trap is being purged. It is commonly known that an internal combustion engine expels hydrocarbons when it combusts a rich air/fuel mixture and expels NOx when it combusts a lean air/fuel mixture. A three-way catalyst is commonly coupled to an exhaust system of an internal combustion engine to reduce the emissions of hydrocarbons and NOx into the atmosphere. However, three-way catalysts may not store and convert a majority of the emissions below a predetermined temperature. To compensate for this problem, hydrocarbon traps are sometimes incorporated into the exhaust system. Hydrocarbon

traps are emission control devices that absorb hydrocarbons when the temperature of the hydrocarbon trap is below a predetermined temperature and which releases and oxidizes the stored hydrocarbons when its temperature rises above the predetermined temperature (i.e., a "purge temperature"). Therefore, a hydrocarbon trap may be useful to limit the amount of released hydrocarbons during the time period before the three-way catalyst reaches the temperature at which it becomes fully effective.

After having absorbed hydrocarbons for a certain period of time, it is desirable to purge the hydrocarbon trap to avoid it becoming overly full. The hydrocarbon trap is purged by providing oxygen to the hydrocarbon trap (to oxidize the stored hydrocarbons) while its temperature is maintained above the purge temperature. Because an internal combustion engine expels oxygen when a lean air/fuel mixture is combusted, it is known practice to provide a lean air/fuel mixture to the engine when the hydrocarbon trap is purged. In particular, the non-combusted oxygen expelled from the engine is used to purge the hydrocarbon trap. Known systems, however, have avoided combusting a rich air/fuel mixture during a hydrocarbon trap purge because the purge process alone results in a significant amount of hydrocarbons being released into the exhaust stream. The additional hydrocarbons from a combusted rich air/fuel mixture (added to the purged hydrocarbons) would increase the likelihood of undesirable hydrocarbons being expelled from a downstream catalyst in the known systems.

The present invention relates to a system and method wherein, contrary to known practice, the engine is supplied with a rich air/fuel mixture during the purging of a coupled hydrocarbon trap. The inventive system generally includes (i) a hydrocarbon trap positioned in an exhaust path downstream of the engine; (ii) an air supply device that

supplies oxygen to the hydrocarbon trap; and (iii) a controller that biases the engine air/fuel mixture rich of stoichiometry when the air supply device is supplying oxygen to the hydrocarbon trap, and thus, the hydrocarbon trap is being purged. The delivery of oxygen from the air supply device compensates for the simultaneous expulsion of hydrocarbons into the exhaust stream from both the engine and the hydrocarbon trap to reduce hydrocarbon emissions.

VI. ISSUES

1. Has the Examiner failed to demonstrate that claims 5-7, 9-10, and 11 are anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,916,129 to Modica et al., where Modica does not disclose providing a rich air/fuel mixture to the engine *while purging* hydrocarbons from an emission control device?

VII. GROUPING OF CLAIMS

All of the claims 5-7 and 9-13 stand or fall together.

VIII. ARGUMENT

A. Background

The Examiner has rejected independent claims 5, 9, and 11 (and dependent claims 6-8 and 10) as being anticipated by Modica. Modica is directed to an emission control system having a catalytic converter 8, a sulfur oxide absorbent device 5, and a heat exchanger 2. *Modica,* column 1, lines 8-13.

Figure 3 of Modica (reproduced adjacent this paragraph) illustrates one embodiment of the Modica invention that further includes a hydrocarbon trap 16. Engine 1 produces exhaust gases, which flow through heat exchanger 2 by way of line 3, where heat is transferred from the hot exhaust gas to heat exchanger 2. *Modica,* column 10, line 66 – column 11, line1. The cooled exhaust gas then flows from heat exchanger 2 through line 4 to sulfur oxide absorption zone 5. *Modica,* column11, lines 1-3. The exhaust gas then passes through sulfur oxide absorption zone 5 where sulfur oxides are removed from the exhaust gas. *Modica,* column 11, lines 3-6. Exhaust gas from sulfur oxide absorption zone 5 passes through line 15 to hydrocarbon adsorption zone 16. *Modica,* column11, lines 6-9. Exhaust gas from hydrocarbon adsorption zone 16 is passed through line 17 to heat exchanger 2 wherein it is heated by the heat that it previously gave up during it initial passage through heat exchanger 2 via line 3. *Modica,* column 11, lines 9-13. The heated exhaust gas is then discharged from heat exchanger 2 through line 7 and is passed to catalytic converter 8. *Modica,* column 11, lines 13-17.

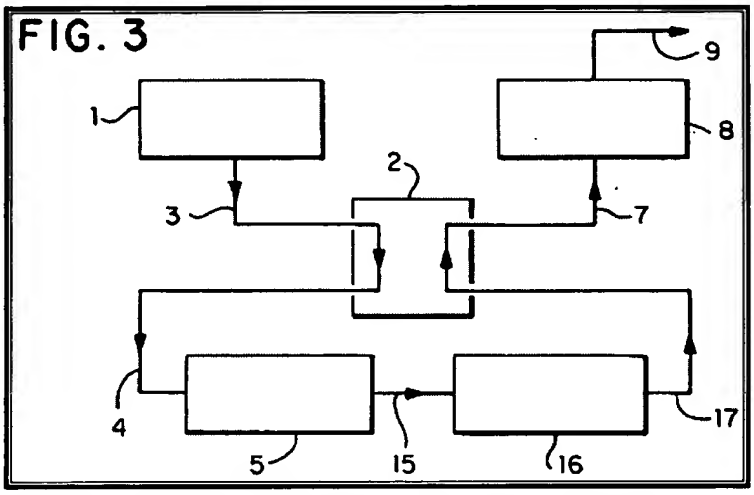
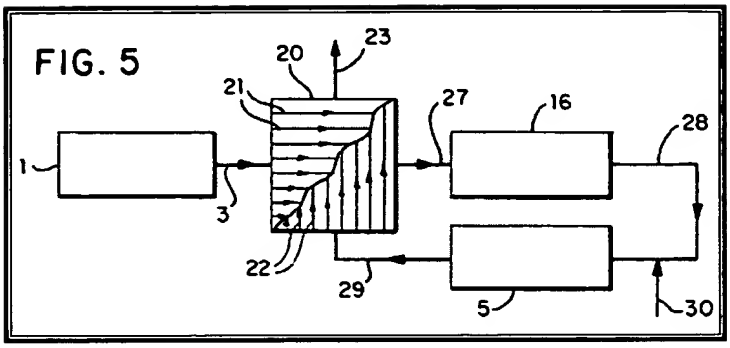


Figure 5 of Modica (reproduced adjacent this paragraph) illustrates a second embodiment of the Modica invention that also includes a hydrocarbon trap. The embodiment illustrated in Figure 5 is similar to that of Figure 3, except that the catalytic

converter 8 and the heat exchanger 2 are combined into a single physical device 20. In this embodiment, exhaust gas from engine 1 flows through line 3 to catalytic converter 20. The exhaust gas then flows through a first plurality of heat exchange passages 21 in catalytic converter 20. Exhaust gas is then conveyed through line 27 to hydrocarbon adsorption zone 16. Exhaust gas from hydrocarbon adsorption zone 16 flows through line 28 to sulfur oxide absorption zone 5. Exhaust gas from sulfur oxide absorption zone 5 passes through line 29 to catalytic converter 20, where the gas flows though a second plurality of heat exchange passages 22, which are in heat exchange relationship with the first plurality of heat exchange passages 21. The resulting gas is discharged from catalytic converter 20 through line 23. Modica indicates that, if desired, supplemental air can be added through line 30 to the exhaust gas before it is passed into sulfur oxide absorption zone 5.



B. Issue No. 1

Applicant submits that the Examiner has failed to demonstrate that all of the elements of claims 5-7, 9-10, and 11 are disclosed in Modica. Specifically, the Examiner has not demonstrated that Modica teaches combusting a rich air/fuel mixture *while purging hydrocarbons from an emission control device*, which is effectively recited in each of the independent claims 5, 9, and 11.

At the outset, Modica does not even mention the concept of purging an emission control device (e.g. a hydrocarbon trap) of hydrocarbons. In Figures 3 and 5, Modica discloses three types of emission control devices: (i) a three-way catalytic converter 20, (ii) a sulfur oxide absorbent device 5, and (iii) a hydrocarbon adsorption zone 16. Modica does not, however, teach or suggest any method for purging these emission control devices of hydrocarbons, let alone teach or suggest a particular manner in which to control the engine air/fuel mixture while purging the device as claimed. Further, in particular, Modica does not disclose or suggest that it would be possible to combust a "rich" air/fuel mixture while purging a hydrocarbon trap as recited in claims 5, 9, 11. Modica merely recognizes that operating the engine with a rich air/fuel mixture enhances the conversion of NOx to nitrogen. *Modica*, column 15, lines 29-32. Modica does not, however, teach or suggest the step of combusting a rich air/fuel mixture when hydrocarbons are being purged from an emission control device, as set forth in pending claims 5, 9, and 11.

In the Final Office Action, in particular, the Examiner pointed to col. 10, lines 28-45 and col. 15, lines 29-39 for allegedly teaching the step of combusting a rich air/fuel mixture while purging hydrocarbons from an emission control device. *See,* Final Office Action, p.2, lines 12-14. The first passage from Modica relied upon by the Examiner is as follows:

> The addition of air to the exhaust gas before it enters sulfur oxide absorption zone 5 can be advantageous when the engine is operated with a rich air/fuel mixture to produce an exhaust gas which is reducing in character. The addition of air to such a reducing exhaust gas can be used to minimize or prevent any possible release of a sulfur containing gas, such as hydrogen sulfide, which might occur by reduction of sulfur oxides which have been absorbed by the sulfur oxide absorbent in absorption zone 5. Such supplemental air can, of course, also react with the reducing components of the exhaust gas and thereby prevent their discharge as undesirable emissions. Any air pump or blower of conventional design can be used to provide the supplemental air.

> In a highly preferred embodiment of the invention, a hydrocarbon adsorbent is used in combination with the sulfur oxide absorbent. In such an embodiment, sulfur oxide absorption zone 5 can additionally comprise the hydrocarbon adsorbent. (Col. 10, lines 28-45 (emphasis added).

This passage indicates that supplemental air can be injected upstream of the sulfur oxide absorption zone while the engine combusts a rich air/fuel mixture to prevent the emission of sulfur containing gas. However, this passage *does not* teach or suggest the step of combusting a rich air/fuel mixture *when the hydrocarbon trap is releasing hydrocarbons.* In fact, Modica is silent as to the state of the hydrocarbon absorbent.

The second passage from Modica relied upon by the Examiner is as follows:

> In this embodiment, the engine can be operated with a rich air/fuel mixture which will provide a reducing environment in the first passages 21 which will enhance the conversion of nitrogen oxides to nitrogen. Supplemental air can then be added to the exhaust gas before it is passed through the sulfur oxide absorbent or the second passages 22. The oxygen provided by this supplemental air serves to enhance the absorption of sulfur oxides by the sulfur oxide absorbent and also serves to ensure the effective conversion of carbon monoxide and organic compounds, such as hydrocarbons, to innocuous products upon contact with the catalyst in the second passages 22.

This second passage from Modica is similar to the first in that it teaches the concept of supplying oxygen upstream of the sulfur oxide absorption zone to enhance the absorption of sulfur oxides and oxidize hydrocarbons generated from the combustion of a rich air/fuel mixture in the engine. This passage further teaches that the supplemental air can assist in conversion of hydrocarbons upon contact with the catalyst. However, this passage clearly does not teach combusting a rich air/fuel mixture when the hydrocarbon trap is releasing hydrocarbons, as recited in claims 5, 9 and 11.

Because Modica fails to teach all of the elements of independent claims 5, 9 and 11, Applicant submits the rejection of these claims under 35 U.S.C. 102(b) is improper. Further Applicant submits that the rejection of claims 6-7, 10, and 12-13, which depend

from claims 5, 9 and 11, is also improper. Accordingly, Applicant submits that claims 5-7 and 9-13 are allowable over the Modica reference.

IX. CONCLUSION

In view of the foregoing arguments, Applicant respectfully submits that the present application for a system and method for controlling engine air/fuel ratio during hydrocarbon trap purging is novel in view of Modica. The Examiner's rejection of claims 5-7 and 9-13 is improper because Modica does not teach or suggest each and every element of the claimed invention. In view of the above considerations, a reversal of the rejections of record is respectfully requested.

The fee of $320.00, as applicable under the provisions of 37 C.F.R. §1.17(c), should be charged to Deposit Account No. 06-1510 (Ford Global Technologies, Inc.). Please charge any additional fees or credits to this Deposit Account as authorized by the original transmittal letter in this application. A duplicate of this notice is enclosed for this purpose.

Respectfully submitted,

Date: November 12, 2002

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Enclosure – Appendix

X. APPENDIX – CLAIMS ON APPEAL

5. A method of controlling an air/fuel ratio in an internal combustion engine, comprising the steps:

purging hydrocarbons from an emission control device; and

adjusting the air/fuel ratio in the engine rich of stoichiometry while purging the hydrocarbons.

6. The method of claim 5, wherein said purging step comprises providing air from an air supply device to an exhaust stream upstream of said hydrocarbon trap.

7. The method of claim 6, wherein said air supply device is an air pump.

9. A system for controlling an air/fuel ratio in an internal combustion engine, comprising:

a hydrocarbon trap positioned in an exhaust path downstream of the engine;

an air supply device capable of selectively providing a supply of air to said exhaust path upstream of said hydrocarbon trap; and

a controller for biasing the air/fuel ratio in the engine rich of stoichiometry during a time period when said air pump is providing air to said exhaust path.

10. The system of claim 9, wherein said air supply device is an air pump.

11. A method for controlling an engine, said engine communicating with a first emission control device, said first emission control device communicating with a second emission control device, said method comprising:

combusting an air-fuel mixture rich of stoichiometry in an engine cylinder to reduce NOx stored in said first emission control device; and

applying oxygen upstream of said second emission control device to oxidize hydrocarbons stored in said second emission control device and hydrocarbons from said combusted rich air-fuel mixture.

12. The method of claim 11, further comprising the step:

indicating when said second emission control device needs to be purged of hydrocarbons.

13. The method of claim 12, wherein said step of indicating when said second emission control device needs to be purged of hydrocarbons includes the steps:

measuring a temperature of exhaust gases entering said second emission control device; and

determining when said second emission control device needs to be purged of hydrocarbons when said temperature is greater than a threshold temperature.